DA01

TO: All Direct Reports

FROM: DA01/A. G. Stephenson

SUBJECT: Project Team Roles and Responsibilities

In October of last year, I prepared a draft White Paper to clarify the roles of Project Managers, Lead Systems Engineers, Lead Subsystems Engineers and Chief Engineers. During the ensuing months, I have received feedback not only from my Direct Reports, but also from a broad sampling of the people who will be most affected by it. I have presented my thoughts on the subject to the Systems Engineering Overview training classes, responded to questions and suggestions regarding the purpose and implementation of the White Paper, and accounted for the written feedback provided by training class participants. Every suggestion offered has been considered in developing the final version.

The resulting White Paper should be the standard by which all projects at MSFC function. There may be exceptions for special cases, but it is my intent that the spirit of this document be implemented on every project. Exceptions must be approved at the Directorate level.

I am directing the Systems Management Office to facilitate the implementation of this directive in MSFC ISO documentation. I am further directing that office to complete, and upon my approval, distribute to all projects the MSFC Project Checklist referenced in the directive.

I view a consistent approach to project organization and implementation across the Center as being vital to success, and I have confidence that the effective implementation of this directive is a step in the right direction.

A. G. Stephenson
Director

Attachment

Project Manager, Lead Systems Engineer and Lead Subsystems Engineer Roles and Responsibilities

Projects at MSFC are conducted by Project Teams. Elements of any Project Team are the Project Manager, Lead Systems Engineer, and Lead Subsystems Engineers. This paper describes the roles, responsibilities and interrelationships of these Project Team members. The directorate/major project (e.g., Shuttle) Chief Engineer relationship to projects is also addressed. Although the Project Scientist, the Safety and Mission Assurance Office and supporting organizations make significant and essential contributions to any project over it's lifetime, those individuals and offices are outside the scope of this paper. The intent of this paper is to define the roles and responsibilities of the Project Manager (PM), Lead Systems Engineer (LSE), Lead Subsystems Engineer (LSSE) and Chief Engineer (CE). All new projects will be established and will function per the roles and responsibilities defined in this paper. Existing projects will meet the intent of this paper, and the Directorate Head or Program Office in which the project is managed must justify deviations.

Summary Overview:

1) The Project Manager (PM) is responsible for all aspects of the project (programmatic, risk, technical, schedule, and resources, including people, funding, facilities and contractual matters) and is accountable to the Directorate Head or Program Office to which his/her project is assigned.
2) The Lead Systems Engineer (LSE) is responsible for defining requirements and assuring that the system meets the approved requirements and is accountable to the PM.
3) The Lead Subsystem Engineer (LSSE) is responsible for assuring that the technical performance of the subsystem element is acceptable and is accountable to the PM. The LSSE is not a member of the Project Office, but is still accountable to the PM for the performance of the assigned subsystem, while administratively reporting to the functional organization. The LSSE remains accountable to his/her functional line managers for all activities, including those associated with the project being supported.
4) The Chief Engineer (CE) is responsible for overseeing technical aspects of all projects within his/her Directorate/Office, and is accountable to the Directorate Head/Office Manager.

Project Manager (PM):

The PM is accountable for all aspects of the project, including those of the LSE and LSSE, assuring that the project requirements are met within budget and schedule.

The PM forms the project team, working with the line or functional management to obtain the proper staff for the tasks needed to carry out the project. The PM is responsible for making changes in team membership as the project progresses, if necessary, to achieve the goals. Team members are reassigned a) if the team is not functioning effectively or b) to maintain skills required for continuous progress. The PM is the primary point of contact for interfacing with the functional organizations for the

assignment of the key positions that are accountable to him/her on the project. The managers of support organizations providing the Project Team staffing must obtain PM agreement before reassigning anyone on a project. The PM on any project has direct appeal to the Directorate Head of an organization that removes someone from his/her project without agreement; however, PMs will work with functional managers as partners and avoid appealing to a higher level until all efforts to reach agreement have been exhausted.

The PM is responsible for working with the Project Team and the customer to establish the Project Mission Success Criteria, which, once established, may not be changed without the consent of the customer. The PM is responsible for meeting the cost goals of the project and for managing management reserve, and must also oversee the development of a Work Breakdown Structure (WBS) and the allocation of budgets to each element of the WBS.

The PM provides the top-level interface to the corresponding contractor team PM and is the primary point of contact to the customer on project issues. The customer, in this case, can be the source of project funds, the science/technology sponsors, or both. The PM ensures that the project is conducted in compliance with NPG 7120.5A and MPG 7120.1, maintains a project plan and project check list, and leads and implements a comprehensive Risk Management Process throughout the life cycle of the project. The project checklist should be tailored for the project from the MSFC Project Checklist and should be assessed by team members periodically to help flag things needing attention. The PM ensures that necessary and sufficient reviews and associated review processes are planned for the project from the outset and that they are conducted as scheduled by relevant personnel. The PM ensures that Review Item Discrepancies are addressed and closed in a timely manner. The PM may delegate this function to the LSE or to the Deputy PM.

The PM is accountable to and is the primary point of contact to the Directorate Head for all aspects of project performance, including the S&MA function, and to the Directorate Chief Engineer for the technical performance.

The PM is responsible for all formal documentation on his/her project. This documentation must comply with MPG 7120.1 and includes the definition, flow down and control of requirements, plus failure, discrepancy, anomaly and nonconformance reporting. A specification tree and formally documented and controlled Interface Control Documents (ICDs) are required on every project, as is the involvement of a formal Change Control Board. A formal WBS is also required on every project for planning and implementing staffing needs and any other resource requirements.

The PM’s background/experience should include prior assignments as a LSSE and a LSE. Six months to one year’s experience in S&MA and in SMO is also a desirable part of the PM’s resume.

Lead Systems Engineer (LSE):

The LSE is accountable to the PM to assure that the project's top-level system requirements are met. To accomplish this, the LSE (and his/her team) flows the requirements from the system level to the subsystem level and, working with the LSSEs, to the component level. The Systems Engineering Team consists of the LSE as team lead, his/her supporting staff, if required, and all LSSEs assigned to the project. The LSE is responsible for systems engineering and integration of the system and ensures that the requirements are valid, that they trace from the top level to the component level, and that they are properly assessed at every major review in the project cycle.

Early in the project and at times during the project life cycle, the Systems Engineering Team performs system level trade-studies leading to the best system architecture approach to meet the requirements. These trade studies are rigorous and are based on the top-level requirements and alternative system options scored in relation to the requirements. Programmatic constraints, as well as technical constraints, are addressed.

The LSE is responsible for supporting and participating in the system level risk management process, as a member of the risk management team, and for integrating, at the system level, risk status, control and communication. He/she is responsible for project technical integration that is inclusive of all integration efforts, including fault management, electrical design integration and mechanical design integration.

The LSE is responsible for the development of the Operations Concept early in the project life cycle and ensures that this concept is properly integrated into the system requirements and their flowdown. If operations is a major component of the system, an operations function separate from the LSE might be formed with a lead similar to a LSSE.

The LSE is responsible for ensuring that a complete and thorough Verification Plan is in place and agreed to by the supporting organizations early in the Implementation Phase of the project. He or she is responsible for ensuring that the Verification Plan is properly executed at the component, subsystem and system levels. Subsystem and component verification programs are carried out by the subsystems' organizations, while system level verification may be carried out by the systems test organization (often a contractor) with concurrence by the MSFC Systems Engineering Team.

The Systems Engineering Team is responsible for system performance analyses, error budgets, resource allocation, electrical and mechanical design integration at the system level, interface definition and control, electromagnetic interference (EMI), electromagnetic compatibility (EMC), mass properties, configuration management, design/safety review coordination, and system technical performance measurement (TPM) parameters (e.g. power, weight, cooling, bandwidth, etc.). These are reported at Directorate monthly project reviews and at major project milestones. The LSE acts as the integrator of functions not falling into a specific subsystem, such as electrical and mechanical design integration functions.

The LSE is responsible for the functions stated above; and for these functions, the LSSEs take direction from the LSE. This authority is delegated to the LSE from the PM. LSSEs must keep the LSE informed on issues that affect the system level performance.

The LSE's background/experience should include prior assignment as a LSSE. Rotational assignee experience in S&MA and in SMO is also a desirable part of the LSE's resume.

Lead Subsystems Engineer (LSSE):

The LSSEs are accountable to the PM and are responsible for assuring that the subsystem requirements flowed down from the system requirements are met. Subsystem examples are structures, thermal, propulsion, attitude control, power, guidance and navigation, communications, etc. LSSEs are responsible for making sure that the respective subsystem risk management activities are properly executed.

The PM delegates the responsibility to achieve the subsystem requirements to the LSSE. For example, a technical issue involving structural design will be resolved by the Structural LSSE. The LSE will not be involved unless the solution impacts a system level requirement. If it does, the LSSE must work with the LSE to resolve the issue, since the LSE maintains system level configuration management.

The LSSEs work with their line management to staff their subsystem tasks on the project and ensure the subsystems meet all requirements. Although the PM negotiates with the functional line organization for assignment of each subsystem LSSE, more complex projects will require other technical personnel to support the LSSE. LSSEs may require assistance from various disciplines, and are responsible for securing this assistance through their line management. For instance, the Avionics LSSE may require structural, thermal, etc. support in the design of hardware. The LSSE will work within his/her own line management to secure and, if necessary, modify this support. During project formulation, the LSE will assist in forming this LSSE team. The LSE's involvement during implementation, however, will be limited to issues associated with systems level requirements compliance. If the subsystem team is not functioning effectively and a change in the team composition is needed, the LSSE works with the line organization and, if necessary, with the PM to effect personnel changes.

Chief Engineer (CE):

The CE oversees technical aspects of all projects within his/her organization, and is accountable to the Directorate Head/Office Manager in which the work is performed. The CE works closely with the PMs, and mentors LSEs and LSSEs and provides them with lessons learned. He/she provides technical advice to the Directorate Heads and Program Managers, and assures that technical skill mixes and tool utilization within the Directorate/Office are appropriate. The CE communicates with other CEs at MSFC to assure that inter-organizational approaches to the resolution of technical issues are consistent, and that lessons learned are transferred.